

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

- 5 1 (currently amended): A nitride based light emitting diode (LED) comprising:  
a substrate;  
a first conductivity type contact layer formed over the substrate, the first conductivity  
type contact layer being made of  $Al_{x1}In_{y1}Ga_{1-(x1+y1)}N$  ( $0 \leq x1 \leq 1$ ;  $0 \leq y1 \leq 1$ ; and  
 $0 \leq x1+y1 \leq 1$ );
- 10 a light emitting layer formed over the first conductivity type nitride based contact  
layer;  
a second conductivity type contact layer formed over the light emitting layer, the  
second conductivity type contact layer being made of  $Al_{x2}In_{y2}Ga_{1-(x2+y2)}N$  ( $0 \leq x2$   
 $\leq 1$ ;  $0 \leq y2 \leq 1$ ; and  $0 \leq x2+y2 \leq 1$ );
- 15 ~~a light emitting stacked structure formed over the substrate;~~  
a nitride based dual dopant contact layer formed over the second conductivity type  
contact layer ~~light emitting stacked structure~~, the nitride based dual dopant  
contact layer comprising at least a p-type impurity dopant and an ~~an~~ [[a]] n-type  
impurity wherein dopant, and a material of the p-type dopant being different  
20 from a material of the n-type dopant a concentration of the n-type impurity being  
higher than a concentration of the p-type impurity; and  
a transparent conductive oxide layer formed over the nitride based dual dopant contact  
layer.
- 25 2 (previously presented): The LED of claim 1, wherein the nitride based dual dopant  
contact layer is made of  $Al_aIn_bGa_{1-(a+b)}N$  ( $0 \leq a \leq 1$ ;  $0 \leq b \leq 1$ ; and  $0 \leq a+b \leq 1$ ),  
the transparent conductive oxide layer is made of indium-tin oxide (ITO),  
cadmium-tin oxide, antimony-tin oxide (ATO), zinc oxide (ZnO), or zinc-tin  
oxide.

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3 (currently amended): The LED of claim 1, wherein the nitride based dual dopant contact layer is formed by adding the p-type dopants impurity and the n-type dopants impurity together through an epitaxy growth.

5 4 (previously presented): The LED of claim 1, wherein the nitride based dual dopant contact layer is formed by: providing a second conductive type contact layer on the light emitting stacked structure; then providing a first conductive type contact layer on the second conductive type contact layer; and then cooling the LED through a cooling rate less than 40°C/min.

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5-6 (cancelled).

7 (currently amended): The LED of ~~claim 5~~ claim 1, wherein the ~~multiple-quantum well light emitting layer~~ has  $r$  InGa <sub>$f$</sub> N quantum wells and  $(r+1)$  InGa <sub>$f$</sub> N barriers, each InGa <sub>$f$</sub> N quantum well is sandwiched in between two InGa <sub>$f$</sub> N barriers, each InGa <sub>$f$</sub> N quantum well is fabricated by In <sub>$e$</sub> Ga <sub>$1-e$</sub> N, and each InGa <sub>$f$</sub> N barrier is made of In <sub>$f$</sub> Ga <sub>$1-f$</sub> N,  $r \geq 1$ , and  $0 \leq f < e \leq 1$ .

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8 (currently amended): The LED of ~~claim 5~~ claim 1 further comprising a first conductivity type cladding layer interposed between the first conductivity type contact layer and the ~~multiple-quantum-well~~ light emitting layer, and the first conductivity type cladding layer is made of Al <sub>$x$</sub> Ga <sub>$1-x$</sub> N, and  $0 \leq x \leq 1$ .

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9 (currently amended): The LED of ~~claim 5~~ claim 1 further comprising a second conductivity type cladding layer interposed between the second conductivity type contact layer and the ~~multiple-quantum-well~~ light emitting layer, and the second conductivity type cladding layer is made of Al <sub>$z$</sub> Ga <sub>$1-z$</sub> N, and  $0 \leq z \leq 1$ .

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10-18 (cancelled).

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19 (currently amended): The LED of claim 1 wherein the nitride based dual dopant

contact layer is made of  $\text{Al}_a\text{In}_b\text{Ga}_{1-(a+b)}\text{N}$  ( $0 \leq a \leq 1$ ;  $0 \leq b \leq 1$ ; and  $0 \leq a+b \leq 1$ );  
the n-type dopants are impurity is selected from the group consisting made of Si,  
Ge, Sn, Te, O, S, or and C; and the p-type dopants are impurity is selected from  
the group consisting made of Mg, Zn, Be, or and Ca.

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20 (currently amended): A nitride based light emitting diode (LED) comprising:  
a substrate;

a light emitting stacked structure formed over the substrate;

~~a nitride based dual dopant contact layer formed over the light emitting stacked~~  
10 ~~structure, the nitride based dual dopant contact layer being made of~~  
 ~~$\text{Al}_a\text{In}_b\text{Ga}_{1-(a+b)}\text{N}$  ( $0 \leq a \leq 1$ ;  $0 \leq b \leq 1$ ; and  $0 \leq a+b \leq 1$ ) and comprising at least a~~  
~~p-type dopant and an n-type dopant, a material of the p-type dopant being~~  
~~different from a material of the n-type dopant~~

a nitride based dual dopant contact layer formed over the light emitting stacked  
15 structure, the nitride based dual dopant contact layer comprising a p-type  
impurity and an n-type impurity, wherein the dual dopant contact layer is  
essentially not p-type; and

a transparent conductive oxide layer formed over the nitride based dual dopant contact  
layer.

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21 (cancelled).

22 (new): The LED of claim 20, wherein the nitride based dual dopant contact layer is  
made of  $\text{Al}_a\text{In}_b\text{Ga}_{1-(a+b)}\text{N}$  ( $0 \leq a \leq 1$ ;  $0 \leq b \leq 1$ ; and  $0 \leq a+b \leq 1$ ), the transparent  
25 conductive oxide layer is made of indium-tin oxide (ITO), cadmium-tin oxide,  
antimony-tin oxide (ATO), zinc oxide (ZnO), or zinc-tin oxide.

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23 (new): The LED of claim 20, wherein the nitride based dual dopant contact layer is  
formed by adding the p-type impurity and the n-type impurity together through  
30 an epitaxy growth.

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24 (new): The LED of claim 20, wherein the light emitting stacked structure comprises a multiple quantum well, the multiple quantum well has  $r$  InGaN quantum wells and  $(r+1)$  InGaN barriers, each InGaN quantum well is sandwiched in between two InGaN barriers, each InGaN quantum well is fabricated by  $\text{In}_c\text{Ga}_{1-c}\text{N}$ , and each InGaN barrier is made of  $\text{In}_f\text{Ga}_{1-f}\text{N}$ ,  $r \geq 1$ , and  $0 \leq f < c \leq 1$ .

25 (new): The LED of claim 24 further comprising a first conductivity type cladding layer interposed between the first conductivity type contact layer and the multiple quantum well light emitting layer and the first conductivity type cladding layer is made of  $\text{Al}_x\text{Ga}_{1-x}\text{N}$ , and  $0 \leq x \leq 1$ .

26 (new): The LED of claim 24 further comprising a second conductivity type cladding layer interposed between the second conductivity type contact layer and the multiple quantum well light emitting layer and the second conductivity type cladding layer is made of  $\text{Al}_z\text{Ga}_{1-z}\text{N}$ , and  $0 \leq z \leq 1$ .

27 (new): The LED of claim 20 wherein the nitride based dual dopant contact layer is made of  $\text{Al}_a\text{In}_b\text{Ga}_{1-(a+b)}\text{N}$  ( $0 \leq a \leq 1$ ;  $0 \leq b \leq 1$ ; and  $0 \leq a+b \leq 1$ ); the n-type impurity are made of Si, Ge, Sn, Te, O, S, or C; and the p-type impurity are made of Mg, Zn, Be, or Ca.

28 (new): The LED of claim 20 wherein the dual dopant contact layer has a thickness less than 60 angstroms.

29 (new) The LED of claim 1 wherein the dual dopant contact layer has a thickness less than 60 angstroms.

30 (new): A nitride based light emitting diode (LED) comprising:  
a substrate;  
a light emitting stacked structure formed over the substrate;

a nitride based dual dopant contact layer formed over the light emitting stacked structure, the nitride based dual dopant contact layer comprising a p-type impurity and an n-type impurity wherein the dual dopant contact layer is essentially not a highly conductive layer; and

5 a transparent conductive oxide layer formed over the nitride based dual dopant contact layer.

31 (new): The LED of claim 30, wherein the nitride based dual dopant contact layer is made of  $\text{Al}_a\text{In}_b\text{Ga}_{1-(a+b)}\text{N}$  ( $0 \leq a \leq 1$ ;  $0 \leq b \leq 1$ ; and  $0 \leq a+b \leq 1$ ), the transparent

10 conductive oxide layer is made of indium-tin oxide (ITO), cadmium-tin oxide, antimony-tin oxide (ATO), zinc oxide (ZnO), or zinc-tin oxide.

32 (new): The LED of claim 30, wherein the nitride based dual dopant contact layer is formed by adding the p-type impurity and the n-type dopants together through

15 an epitaxy growth.

33 (new): The LED of claim 30, wherein the light emitting stacked structure comprising a multiple quantum well, the multiple quantum well has  $r$  InGaN quantum wells and  $(r+1)$  InGaN barriers, each InGaN quantum well is

20 sandwiched in between two InGaN barriers, each InGaN quantum well is fabricated by  $\text{In}_e\text{Ga}_{1-e}\text{N}$ , and each InGaN barrier is made of  $\text{In}_f\text{Ga}_{1-f}\text{N}$ ,  $r \geq 1$ , and  $0 \leq f < e \leq 1$ .

34 (new): The LED of claim 33 further comprising a first conductivity type cladding layer interposed between the first conductivity type contact layer and the multiple quantum well light emitting layer and the first conductivity type

25 cladding layer is made of  $\text{Al}_x\text{Ga}_{1-x}\text{N}$ , and  $0 \leq x \leq 1$ .

35 (new): The LED of claim 33 further comprising a second conductivity type cladding layer interposed between the second conductivity type contact layer and the multiple quantum well light emitting layer and the second conductivity

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type cladding layer is made of  $\text{Al}_z\text{Ga}_{1-z}\text{N}$ , and  $0 \leq z \leq 1$ .

36 (new): The LED of claim 30 wherein the nitride based dual dopant contact layer is made of  $\text{Al}_a\text{In}_b\text{Ga}_{1-(a+b)}\text{N}$  ( $0 \leq a \leq 1$ ;  $0 \leq b \leq 1$ ; and  $0 \leq a+b \leq 1$ ); the n-type impurity are made of Si, Ge, Sn, Te, O, S, or C; and the p-type impurity are made of Mg, Zn, Be, or Ca.

37 (new): The LED of claim 30 wherein the dual dopant contact layer has a thickness less than 60 angstroms.

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38 (new): The LED of claim 30 wherein the dual dopant contact layer has a p-type carrier concentration lower than  $5 \times 10^{18} \text{ cm}^{-3}$ .